

**IN THE CLAIMS**

**WE CLAIM:**

- 1 1. A catalytic cavitation reactor comprising:
  - 2 an inner pipe having a wall with plurality of spaced apart radially bored inner pipe holes
  - 3 located thereon, an entry end and an exit end having a cap thereon;
  - 4 a second pipe, joined to said inner pipe, having a wall with plurality of spaced apart
  - 5 radially bored second pipe holes located thereon, an entry end and an exit end having a cap
  - 6 thereon, said inner pipe located within said second pipe;
  - 7 a length of static mixing baffles are inserted into the interior of said second pipe between
  - 8 the area containing the inner pipe holes and the second pipe holes;
  - 9 an outer pipe, joined to said second pipe, an entry end and an exit end having a cap
  - 10 thereon, said second pipe located within said outer pipe;
  - 11 a length of static mixing baffles are inserted into the interior of said outer pipe between
  - 12 the area containing the second pipe holes and the outer pipe holes; and
  - 13 a plurality of nozzles, wherein each of said inner pipe holes and second pipe holes
  - 14 receives one of said plurality of nozzles, each of said plurality of nozzles having an inlet end, an
  - 15 outlet end and a constriction therebetween, a catalytically active zone is formed between said
  - 16 said constriction and said outlet end.
- 1 2. The reactor of claim 1 wherein each of said plurality of nozzles is positioned in each of
  - 2 said inner pipe holes and second pipe holes at an angle relative to the wall of the respective
  - 3 pipes.

- 1 3. The reactor of claim 2 wherein said angle is 22.5 degrees relative to the wall of the  
2 respective pipes.
- 1 4. The reactor of claim 1 wherein said constriction is formed from erosion resistant material.
- 1 5. The reactor of claim 4 wherein said catalytically active zone is formed by catalytically  
2 active material.
- 1 6. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 straight cylindrical barrel.
- 1 7. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 single cylinder.
- 1 8. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 multi-chambered cylinder.
- 1 9. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 venturis.
- 1 10. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 converging cones.
- 1 11. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 diverging cones.
- 1 12. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 threaded cylinder.

1 13. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 ball chambered cylinder.

1 14. The reactor of claim 1 wherein said catalytically active zone is dimensionally formed as a  
2 spherical chambered cylinder.

1 15. The reactor of claim 1 wherein the diameter of inner pipe is greater than  $\frac{1}{2}$  inch.

1 16. The reactor of claim X wherein the sum of cross-sectional areas of said plurality of  
2 nozzles located in said inner pipe holes is approximately 2 times the cross-sectional area of said  
3 inner pipe.

1 17. A method for the separation of contaminants within a fluid comprising:  
2 mixing a fluid containing contaminants;  
3 transferring said fluid into a reactor having nozzles as defined by claim 1;  
4 passing said fluid through said nozzles causing cavitation and ionization of said fluid;  
5 removing said fluid contaminants from said fluid.